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### **REMARKS**

This response is intended as a full and complete response to the Office Action mailed September 22, 2005. Please reconsider the claims pending in the application for reasons discussed below.

#### **I. CLAIM OBJECTIONS**

Applicants have amended claims 96 and 105 to add a comma, as requested by the Examiner. Accordingly, Applicants respectfully request withdrawal of the objection and allowance of the claims.

#### **II. REJECTIONS UNDER 35 U.S.C. §101**

Claims 18-22, 27, 30, 32 and 33 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. In response, Applicants have canceled claims 18-22, 27 and 30 without prejudice. Claim 32 has been amended to recite "machine-readable media having encoded thereon a model of a biological system and software configured to cause a processor to run simulations of the biological system via the model" (see, e.g., page 36, lines 27-28 of Applicants' specification). Like claim 96, claims 32 and 33 are directed to "machine-readable media having encoded thereon software to cause a processor to perform steps, which demonstrates a functional interrelationship between the data structure and the processor," as stated by the Examiner. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 32 and 33.

Claims 18-22, 27, 30, 32, 33, 96-98, 100 and 102-107 stand rejected under 35 U.S.C. § 101 as being lacking patentable utility. In response, Applicants have canceled claims 18-22, 27, 30 and 97 without prejudice. First, the Examiner states that "usefulness of a model of a biological system is not apparent." This statement disregards the standard methods of understanding biochemical pathway systems, which involves people staring at hand-drawn biological system pathway representations. In one embodiment, Applicants' invention is used for simulating a biological system or at least one biological reaction. Furthermore, models have been exploited in various fields such as computing for many purposes. The Examiner in contradiction to the statement regarding lack of usefulness then proceeds to state that "[a] model of a biological system is generally useful."

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Secondly, the Examiner lists in the Office Action several uses for the invention identified in the specification, but the Examiner dismisses these uses as being too generic. It is respectfully submitted that the Examiner lacks basis for requiring the claims to recite such specificity. For example, the Examiner states that these "assertions would clearly require further research to confirm that such elements were indeed drug targets." However, the fact that it is prudent to perform follow-up confirmatory experiments does not diminish the utility of computational prediction of candidate drug effects. In a drug discovery pipeline, millions of drug candidates are tried in hope to find one of any value against a specific disease. Application of the claimed invention may identify the candidates with most potential, thereby reducing the required experiments by, for example, a factor of 10 or more. In other words, the claimed invention is adaptable to various specific and unique applications such that a single specific molecule and a single specific receptor under study, for example, are application specific and apparent to one of ordinary skill in the art. Thus, one normally skilled in the art of modern molecular biology would find the claimed invention immediately useful, in reducing workload, increasing accuracy of analysis, and/or increasing the hit rate for drug targets and drug candidates.

Based on the foregoing, Applicants submit that the Examiner has failed to establish a *prima facie* case that the result of the model and program as claimed is not "immediately useful." In fact, the invention has various specific and substantial utility to those of ordinary skill in the art applying the various utilities identified by the Examiner. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 32, 33, 96, 98, 100 and 102-107.

### **III. REJECTIONS UNDER 35 U.S.C. § 112, FIRST PARAGRAPH**

Claims 18-22, 27, 30, 32, 33, 96-98, 100 and 102-107 stand rejected under 35 U.S.C. § 101 as being lacking patentable utility. The Examiner then alleged that one skilled in the art would not know how to use the claimed invention.

In response, Applicants have canceled claims 18-22, 27, 30 and 97 without prejudice. The basis for the rejection is premised on the Examiner's statement that "the claimed invention is not supported by either an asserted utility or a well established utility." However, Applicants submit that such utility has been shown above regarding the § 101

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rejection. Therefore, one skilled in the art clearly would know how to use the claimed invention. Accordingly, Applicants respectfully request withdrawal of the rejection.

#### **IV. REJECTIONS UNDER 35 U.S.C. §112, SECOND PARAGRAPH**

Claims 18-22, 27, 30, 32, 33, 96-98, 100 and 102-107 stand rejected under 35 U.S.C. §112, second paragraph. In response, Applicants have canceled claims 18-22, 27, 30 and 97 without prejudice. Further, Applicants respectfully traverse the rejection.

Regarding claim 32 reciting limitations "express" and "to infer," software is configured to cause a processor to run simulations of a biological system via a model such that these terms are intended to identify operation of the model. Since the simulations are run via the model, Applicants submit that claim 32 clearly identifies acts performed with the article, which are described by terms of art common to one of ordinary skill in the art of automated reasoning. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 32 and 33.

In claims 32, 96 and 105 the Examiner states that the phrase "based on" is vague. Parameters that must be met include any parameters of "the initial hypothetical state." Further, these parameters can be met to any degree to be considered to be "based on the initial hypothetical state." The Examiner lacks basis for requiring any further clarification than the express wording of the claims. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 32, 33, 96, 98, 100 and 102-105.

Claims 96, 105 and 106 have been amended to correct the antecedent basis insufficiency for "the processor." Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 96, 98, 100 and 102-107.

Regarding claim 106, "the values reflecting the abundance of a biological element" are compared to generate symbols, which are iteratively substituted thereby providing the connection among claim elements. As for the "terminal state" phrase, this phrase has a clear meaning in a symbolic computation. In the symbolic realm, there are well defined end states when rewrite rules no longer apply, or result in identical system states. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 106 and 107.

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#### V. REJECTIONS UNDER 35 U.S.C. §102(b)

Claims 18-22, 27, 30, 32, 33, 96-98, 100 and 102-107 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Thalhammer-Reyero* (U.S. Patent No. 5,980,096). In response, Applicants have canceled claims 18-22, 27, 30 and 97 without prejudice. Further, Applicants respectfully traverse the rejection.

Claim 32 recites that "the model of the biological system includes a first set of symbols representing molecules in a first cell and a second set of symbols representing molecules in a second cell." However, *Thalhammer-Reyero* fails to teach, show or suggest representation of compounds from multiple cells.

Claim 96 has been amended to include the limitation of claim 97, which includes "the operator conforming to associative and commutative properties." By contrast to multiset or "associative and commutative" properties, *Thalhammer-Reyero* teaches sets of objects, which means as a term of art that the numbers of elements is unimportant. In a multiset, the numbers of copies of an element is an important attribute that must be tracked. Therefore, *Thalhammer-Reyero* does not teach, show or suggest "associative and commutative" properties as claimed.

Claim 105 states that software is configured to cause a processor to "compare the second set of symbols to the terminal state or to at least one of the alternative resultant states." Comparison of states (represented by a set of symbols) is an important method to determine if a given goal state has been reached. However, *Thalhammer-Reyero* is silent with comparison of states to determine if a given goal state has been reached.

Claim 106 includes a limitation to "iteratively substitute one or more of the symbols representing biological elements by at least another symbol representing a biological element using rules that represent interactions between the biological elements until a terminal state or until alternative resultant states are detected." However, *Thalhammer-Reyero* fails to teach, show or suggest this iterative simplification or abstraction of the state representation.

Therefore, Applicants submit that *Thalhammer-Reyero* fails to teach, show or suggest each and every element of claims 32, 96, 105 and 106. Applicants submit that these claims and all claims dependent thereon are not anticipated by *Thalhammer-Reyero* and are allowable. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of claims 30, 32, 33, 96, 98, 100 and 102-107.

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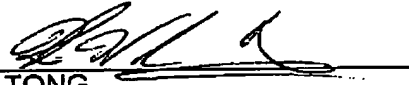
## VI. CONCLUSION

Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issuance are earnestly solicited.

If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone the undersigned at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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